

BMP-21

BMP: LEVEL SPREADER

Definition

An outlet for dikes and diversions consisting of an excavated depression constructed at zero grade across a slope.

Purpose

To convert concentrated runoff to sheet flow and release it uniformly onto areas stabilized by existing vegetation.

Conditions Where Practice Applies

Where there is a need to divert stormwater away from disturbed areas to avoid overstressing erosion control measures; where sediment-free storm runoff can be released in sheet flow down a stabilized slope without causing erosion.

This practice applies only in those situations where the spreader can be constructed on undisturbed soil and the area below the level lip is uniform with a slope of 10% or less and is stabilized by natural vegetation. The runoff water should not be allowed to reconcentrate after release unless it occurs during interception by another measure (such as a permanent pond or detention basin) located below the level spreader.

Planning Considerations

The TEMPORARY DIVERSION DIKE, (BMP-9) and the TEMPORARY RIGHT-OF-WAY DIVERSION, (BMP-11) each call for a stable outlet for concentrated stormwater flows. The level spreader is a relatively low-cost structure to release small volumes of concentrated flow where site conditions are suitable.

The outlet area must be uniform and well-vegetated with slopes 10% or less. Particular care must be taken to construct the outlet lip completely level in a stable, undisturbed soil. Any depressions in the lip will concentrate the flow, resulting in erosion. Under higher design flow conditions, a rigid outlet lip design should be used to create the desired sheet flow conditions. Runoff water

containing high sediment loads must be treated in a sediment trapping device before being released to a level spreader.

Design Criteria

No formal design is required. The following criteria must be met:

Spreader Dimensions-

Determine the capacity of the spreader by estimating the peak flow expected from a 10-year storm (Q_{10}).

Select the appropriate length, width and depth of the spreader from Table 21-1.

For design flows greater than 0.6 cubic meters per second (20 cfs), the measure should be designed by a qualified engineer.

A 6 meter (20-foot) transition section should be formed in the diversion channel so that the width of the diversion will smoothly tie in with the width of the spreader to ensure more uniform outflow.

The depth of the level spreader, as measured from the lip, shall be at least 155 millimeters (6 inches). The depth may be made greater to increase temporary storage capacity, improve trapping of debris and to enhance settling of any suspended solids.

**TABLE 21-1
MINIMUM DIMENSIONS FOR LEVEL SPREADER**

Design Flow Q_{10}		Depth		Width of Lower Side Slope of Spreader		Length	
m ³ /sec	cfs	m	ft	m	ft	m	ft
0-0.3	0-10	0.15	0.5	1.8	6	3	10
0.3-0.6	10-20	0.18	0.6	1.8	6	6	20

Grade-

1. The grade of the channel for the last 6 meters (20 feet) of the dike or diversion entering the level spreader shall be less than or equal to 1%.
2. The grade of the level spreader channel shall be 0%.

Spreader Lip-

The release of the stormwater will be over the level lip onto an undisturbed well-vegetated area with a maximum slope of 10%. The level lip should be of uniform height and zero grade over the length of the spreader.

The level spreader lip may be stabilized by vegetation or may be of a rigid non-erodible material depending on the expected design flow:

<u>Spreader lip</u>	<u>Design Flow</u>	
	<u>m³/sec</u>	<u>(cfs)</u>
Vegetated	0 - 0.1	0 - 4
Rigid	0.1 - 0.6	5 - 20

A vegetated level lip must be constructed with an erosion-resistant material, such as jute or excelsior blankets, to inhibit erosion and allow vegetation to become established.

For higher design flows and permanent installations, a rigid lip of non-erodible material, such as pressure-treated timbers or concrete curbing, should be used.

Construction Specifications

1. Level spreaders must be constructed on undisturbed soil (not fill material).
2. The entrance to the spreader must be shaped in such a manner as to insure that runoff enters directly onto the 0% channel.
3. Construct a 6 meter (20-ft) transition section from the diversion channel to blend smoothly to the width and depth of the spreader.
4. The level lip shall be constructed at 0% grade to insure uniform spreading of stormwater runoff.

5. Protective covering for vegetated lip should be a minimum of 1 meter (4 feet) wide extending 150 millimeters (6 inches) over the lip and buried 150 millimeters (6 inches) deep in a vertical trench on the lower edge. The upper edge should butt against smoothly cut sod and be securely held in place with closely spaced heavy duty wire staples.
6. Rigid level lip should be entrenched at least 50 millimeters (2 inches) below existing ground and securely anchored to prevent displacement. An apron of Coarse Aggregate should be placed to top of level lip and extended downslope at least 1 meter (3 feet). Place filter fabric under stone and use galvanized wire mesh to hold stone securely in place.
7. The released runoff must outlet onto undisturbed stabilized areas with slope not exceeding 10%. Slope must be sufficiently smooth to preserve sheet flow and prevent flow from concentrating.
8. Immediately after its construction, appropriately seed and mulch the entire disturbed area of the spreader.

Maintenance

The measure shall be inspected after every rainfall and repairs made, if required. Level spreader lip must remain at 0% slope to allow proper function of measure. The contractor should avoid the placement of any material on and prevent construction traffic across the structure. If the measure is damaged by construction traffic, it shall be repaired immediately.